and it was shewn that the fermenting action had commenced in the smaller vessel, while in the larger, or outer one, although there was a free communication through the grause, the action had not commenced, nor would it till the particles became sufficiently reduced to pass through the grause. The presence of kreosote turpentine would stop the action of yeast; boiling might be regarded in the light of delaying it, for after some time the action could not be perceived. It might to many appear strange to hear that sugar consisted but of charcoal and water, yet he could shew it by experiment. The lecturer poured some oil of vitrol into syrup; steam was evolved, and a large pasty mass of charcoal formed. The lecturer, in conclusion called attention to a very ingenious plan for brewing, suggested by Sir Thomas Marrable, by which the elaborate apparatus now employed was completely dispensed with. The malt and hops were boiled together, as at present; when it had cooled to about 90°, it was mixed with the yeast, and poured at once into the cask. The cask was fitted with a bent tube, connected with a basin of water, to prevent the access of air, while it allowed a free exit to the carbonic acid so formed. The cask required to be kept at a temperature of 60° or 70° for five weeks, and a very excellent beer was produced; the uppermost and the lowest strata were to be rejected as containing impurities.

ON "SCARFING" OR LENGTHENING OF TIMBERS.

BY MR. JAMES WYLSON.

When beams or other timbers employed in carpentry are required to be of length greater than can be obtained in the *balk*, it is necessary to adopt artificial means of lengthening them, or so connecting together as many pieces of timber lengthwise as will make out the extent required, and which result is obtained by means of the method called *scarfing*. "Scarfing" may, therefore, be termed the art of uniting two or more pieces of timber endwise, so as to make them like one piece, nearly so in appearance, and, if possible, perfectly so with respect to strength.

Of the various methods in use, there are some in which there is no expenditure of the length of the timbers that are to be united, the pieces being joined end to end; in others some sacrifice takes place in this particular from the pieces lapped together. They might also be classified as those which with regard to strain longitudinally and transversely depend for strength of connection, entirely on bolts; and those which in reference to the strain lengthwise have, from being so formed as to clasp together, some independent security in themselves. The clasping, or as it is technically termed, *indenting*, necessarily reduces the depths of the timbers more than a single lap-joint does; and consequently weakens them in a proportionate degree; the practice, therefore, in regard to beams, is less available where there is a weight to be sustained, and less necessary where a tendency to extension is least required to be guarded against, than when the chief or entire purpose is to furnish a tie between two given points—in which case it is recommendable.

Before entering into a detailed description of the variety of scarfs herein exhibited, we must make mention of another and simple method of lengthening timbers, called *fishing*, and which, though inferior in appearance, is perhaps the most efficient in point of strength; and is very convenient for temporary purposes. It consists in abutting against each other the ends of two pieces of timber, and applying to the joint, instead of the plates of iron employed in superior scarfing, two pieces of timber, one on the top and the other below, and bolting the whole together (see fig. 1.) This

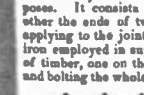

Fig. 1.

joint, like most simple modes of scarfing, depending altogether for strength as a tie upon bolts, may be improved by indenting the pieces

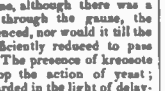

Fig. 2.

together, as shewn by fig. 2, or by introducing

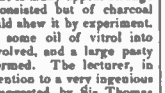

Fig. 3.

keys, as in fig. 3; either of these methods gives resistance to the strain which affects the beam lengthwise, in addition to that of the bolts; but at the same time it must be observed, that as the two main timbers are weakened in the same ratio that they have in the indents been decreased in their depth; therefore consideration has to be made when adopting this mode of connecting timbers lengthwise, whether opposition to the strain above noticed, or to the cross ones of compression and extension which simultaneously proceed from loading, is most to be provided: in other words, whether the compound beam is to be a tie or a support; and as the strain in the former is trifling in comparison with that in the latter, there will be no doubt as to the method which should be adopted; the use of one indented piece only (the under one) is a good compromise where objection to the reduction of strength is not great; since it assists the bolts in holding together the lower half of the main abutting joint. These remarks are equally applicable to scarf-joints.

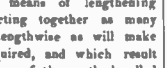

Fig. 4.

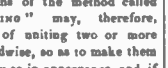

Fig. 5.

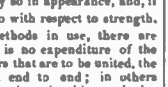

Fig. 6.

Figs. 4, 5, and 6 are modes of *scarfing* which may be adopted when none of the length of either of the pieces can be spared. The first may be used as a tie, without plates or bolts, where little strength is required:—*a* is a key tightened by wedges at *b c d* and *e*, which cause the ends of the timbers to abut closely together. It may be here stated as applying to this and all other cases of wedging in scarf-joints, that the wedges ought to be driven in only just sufficient to bring the abutting surfaces to bear properly on each other. It is a very good practice to place a piece of thin sheet-lead, or, what is better, plate-iron, between the surfaces, in a joint where two timbers, meeting together, the grain of the wood in one is made to abut against that of the other, to prevent them from penetrating each other; this of course only applies to abutting joints; under this denomination those at *a* in Figs. 4, 5, 6, 22, 23, and 24 would come were

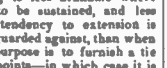

Fig. 22.

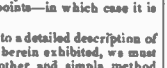

Fig. 23.

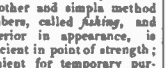

Fig. 24.

the beams loaded above. The second of the

lengthening with an intermediate strengthening piece indented flush into the others by steps, and all three secured together by means of an iron plate and bolts; this is a very good scarf for a bearing-beam, but lengthwise its strength entirely depends on the bolts; in this respect, however, it may be considerably amended by turning in the ends of the plates (supposing it to have two, one at top and another at bottom), as in Fig. 7, &c., and which may be regarded as a good practice generally. The third example being indented, is a fair tie-joint, and if the ends of the connecting piece be splayed inwardly, as shewn at *b*, it will be also effective under a weight.

Fig. 7 A.

Fig. 7 B.

Fig. 7 shews A, the side, and B, the top, of a joint which is very good for purposes where bolts are not intended to be used, and where much strength is not needed; the joint *a* (fig. A) is made just sufficiently easy to allow the wedges fair scope for bringing the parts at *b* (fig. B) close together.

Fig. 8.

Fig. 9.

Fig. 10.

Figs. 8, 9, and 10 are the most simple of those methods, in which sacrifice is made of length of timber equal to that of the scarf; and they may be considered very good joints where the resistance offered by the bolts to the strain which tends to separate the timbers, aided by the degree of connection afforded by turning in the ends of the plates, is deemed equal to the requirements of the case.

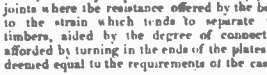

Fig. 11.

Fig. 11 may be considered as an improvement on fig. 8, if the strain is lengthwise; but not so under a cross strain, the depths of the timbers being reduced by the indents.

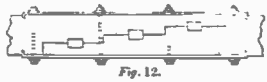

Fig. 12.

Fig. 12. The same remarks apply to this (with reference to fig. 10) as to the preceding, the only difference being that the tie is formed by means of keys instead of by tablings.

(To be continued.)

Colouring.—Nature employs but two metals, iron and copper, for colouring the whole creation. All her variety results from the varied combination of three colours—red, yellow, and azure. What a harmony there is in the rainbow! Take away but one of its principal colours—the red, for instance, and the harmony is gone. The ancient painters, for a long time, employed only these primitive colours; the moderns make use of a considerable number. But with these three, and the addition of black and white, eight hundred and nineteen different combinations may be produced. Hence Apelles and Protogenes might have been as good colourists as [illegible]

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